

CLAIMS

What is claimed is:

1. A method for implementing smart DSL for LDSL systems, the method comprising:
selecting a spectral mask based upon performance criteria; and
activating the selected spectral mask based at least one of customer premise or central office capabilities.
2. The method of claim 1 wherein selecting the spectral mask is performed manually.
3. The method of claim 1 wherein selecting the spectral mask is performed automatically.
4. The method of claim 3 wherein automatic selection of a the spectral mask is performed by line probing.
5. The method of claim 3 wherein automatic selection of a the spectral mask is performed by a many tests procedure performed during a training period.
6. The method of claim 1 wherein activating the selected spectral mask is accomplished by a customer premises equipment decision.
7. The method of claim 1 wherein activating the selected spectral mask is accomplished by a central office decision.

8. The method of claim 1 wherein activating the selected spectral mask is accomplished by a central office decision that overrules a customer premises decision.
9. The method of claim 1 wherein selecting a spectral mask further comprises: selecting a spectral mask from a number of upstream masks ($U_1, U_2, U_3, \dots, U_n$) and a number of downstream masks ($D_1, D_2, D_3, \dots, D_n$).
10. The method of claim 9 wherein one of the number of upstream masks is defined by the following relations, wherein f is a frequency band in kHz and U_1 is the value of the mask in dBm/Hz:

for $0 < f \leq 4$, then $U_1 = -97.5$, with max power in the in 0-4 kHz band of +15 dBm;

for $4 < f \leq 25.875$, then $U_1 = -92.5 + 23.43 \times \log_2(f/4)$;

for $25.875 < f \leq 60.375$, then $U_1 = -29.0$;

for $60.375 < f \leq 90.5$, then $U_1 = -34.5 - 95 \times \log_2(f/60.375)$;

for $90.5 < f \leq 1221$, then $U_1 = -90$;

for $1221 < f \leq 1630$, then $U_1 = -99.5$ peak, with max power in the $[f, f + 1 \text{ MHz}]$ window of $(-90 - 48 \times \log_2(f/1221) + 60)$ dBm; and

for $1630 < f \leq 11040$, then $U_1 = -99.5$ peak, with max power in the $[f, f + 1 \text{ MHz}]$ window of -50 dBm.
11. The method of claim 9 wherein one of the number of downstream masks is defined by the following relations, wherein f is a frequency band in kHz and D_1 is the value of the mask in dBm/Hz:

for $0 < f \leq 4$, then $D_1 = -97.5$, with max power in the in 0-4 kHz band of +15 dBm;

for $4 < f \leq 25.875$, then $D_1 = -92.5 + 20.79 \times \log_2(f/4)$;

for $25.875 < f \leq 81$, then $D_1 = -36.5$;

for $81 < f \leq 92.1$, then $D1 = -36.5 - 70 \times \log_2(f/81)$;
 for $92.1 < f \leq 121.4$, then $D1 = -49.5$;
 for $121.4 < f \leq 138$, then $D1 = -49.5 + 70 \times \log_2(f/121.4)$;
 for $138 < f \leq 353.625$, then $D1 = -36.5 + 0.0139 \times (f - 138)$;
 for $353.625 < f \leq 569.25$, then $D1 = -33.5$;
 for $569.25 < f \leq 1622.5$, then $D1 = -33.5 - 36 \times \log_2(f/569.25)$;
 for $1622.5 < f \leq 3093$, then $D1 = -90$;
 for $3093 < f \leq 4545$, then $D1 = -90$ peak, with maximum power in the $[f, f+1$ MHz] window of $(-36.5 - 36 \times \log_2(f/1104) + 60)$ dBm; and
 for $4545 < f \leq 11040$, then $D1 = -90$ peak, with maximum power in the $[f, f+1$ MHz] window of -50 dBm.

12. The method of claim 9 wherein one of the number of upstream masks is defined by the following relations, wherein f is a frequency band in kHz and $U2$ is the value of the mask in dBm/Hz:

for $0 < f \leq 4$, then $U2 = -97.5$, with max power in the in 0-4 kHz band of $+15$ dBm;
 for $4 < f \leq 25.875$, then $U2 = -92.5 - 22.5 \times \log_2(f/4)$;
 for $25.875 < f \leq 86.25$, then $U2 = -30.9$;
 for $86.25 < f \leq 138.6$, then $U2 = -34.5 - 95 \times \log_2(f/86.25)$;
 for $138.6 < f \leq 1221$, then $U2 = -99.5$;
 for $1221 < f \leq 1630$, then $U2 = -99.5$ peak, with max power in the $[f, f+1$ MHz] window of $(-90 - 48 \times \log_2(f/1221) + 60)$ dBm; and
 for $1630 < f \leq 11040$, then $U2 = -99.5$ peak, with max power in the $[f, f+1$ MHz] window of -50 dBm.

13. The method of claim 9 wherein one of the number of downstream masks is defined by the following peak values, wherein f is a frequency in kHz and D2 is the peak value of the mask in dBm/Hz:
- for $f = 0.0$, then $D2 = -98.0$;
 - for $f = 3.99$, then $D2 = -98.00$;
 - for $f = 4.0$, then $D2 = -92.5$;
 - for $f = 80.0$, then $D2 = -72.5$;
 - for $f = 120.74$, then $D2 = -47.50$;
 - for $f = 120.75$, then $D2 = -37.80$;
 - for $f = 138.0$, then $D2 = -36.8$;
 - for $f = 276.0$, then $D2 = -33.5$;
 - for $f = 677.0625$, then $D2 = -33.5$;
 - for $f = 956.0$, then $D2 = -62.0$;
 - for $f = 1800.0$, then $D2 = -62.0$;
 - for $f = 2290.0$, then $D2 = -90.0$;
 - for $f = 3093.0$, then $D2 = -90.0$;
 - for $f = 4545.0$, then $D2 = -110.0$; and
 - for $f = 12000.0$, then $D2 = -110.0$.
14. The method of claim 9 wherein one of the number of upstream masks is defined by the following peak values, wherein f is a frequency in kHz and U3 is the peak value of the mask in dBm/Hz:
- for $f = 0$, then $U3 = -101.5$;
 - for $f = 4$, then $U3 = -101.5$;
 - for $f = 4$, then $U3 = -96$;
 - for $f = 25.875$, then $U3 = -36.30$;
 - for $f = 103.5$, then $U3 = -36.30$;
 - for $f = 164.1$, then $U3 = -99.5$;
 - for $f = 1221$, then $U3 = -99.5$;

for $f = 1630$, then $U3 = -113.5$; and

for $f = 12000$, then $U3 = -113.5$.

15. The method of claim 9 wherein one of the number of downstream masks is defined by the following peak values, wherein f is a frequency in kHz and $D3$ is the peak value of the mask in dBm/Hz:

for $f = 0$, then $D3 = -101.5$;

for $f = 4$, then $D3 = -101.5$;

for $f = 4$, then $D3 = -96$;

for $f = 80$, then $D3 = -76$;

for $f = 138$, then $D3 = -47.5$;

for $f = 138$, then $D3 = -40$;

for $f = 276$, then $D3 = -37$;

for $f = 552$, then $D3 = -37$;

for $f = 956$, then $D3 = -65.5$;

for $f = 1800$, then $D3 = -65.5$;

for $f = 2290$, then $D3 = -93.5$;

for $f = 3093$, then $D3 = -93.5$;

for $f = 4545$, then $D3 = -113.5$; and

for $f = 12000$, then $D3 = -113.5$.